

Developing Technical Communication Pedagogy For Nonnative Technical Graduate Students

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DEVELOPING TECHNICAL COMPOSITION PEDAGOGY FOR
NONNATIVE TECHNICAL GRADUATE STUDENTS

by

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A thesis submitted in partial fulfillment of the requirements
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ABSTRACT

This thesis seeks to develop a pedagogy for teaching academic writing to nonnative graduate students of technical disciplines in order to give them the skills they need to write papers that they can submit to academic journals and conferences, thereby advancing their careers and gaining recognition for their academic institutions. The work draws on research from the fields of technical communication and second-language acquisition in order to develop pedagogical principles for a class in which nonnative technical graduate students write an academic paper that they can submit for publication. The thesis proposes an approach that incorporates content-based instruction, certain plain language principles, and guided drafting, and then discusses some specifics of a potential class based on those conclusions.

This work is dedicated to my family, who have worked harder on me than
I ever have on anything.

TABLE OF CONTENTS

LIST OF FIGURES	vii
LIST OF TABLES	viii
LIST OF ACRONYMS/ABBREVIATIONS	ix
CHAPTER 1: INTRODUCTION	1
The Target Student and “Publishable Quality”	2
The Gold Standard.....	3
The Lingua Franca of the Scientific World	4
CHAPTER 2: REVIEW OF THE LITERATURE ON PLAIN LANGUAGE AND SCIENTIFIC WRITING.....	7
What is Plain Language?	7
Drafting a Scientific Research Paper	19
CHAPTER 3: REVIEW OF THE TESOL LITERATURE.....	21
Assumptions to Guard Against	21
Krashen and his Critics	22
Modern TESOL Thought and Practice.....	24
CHAPTER 4: DRAWING A MAP	38
Striking the Balance	39
Discussions and Assignments	41
Put it Plainly.....	43
A Place for Grammar	45
Selecting a Drafting Process	46
CHAPTER 5: IMAGINING THE COURSE.....	48

Texts.....	48
Reading Response Assignments	50
Grammar Exercises	55
Peer Review Handouts.....	58
Course Schedule.....	61
CHAPTER 6: LIMITATIONS, APPLICATIONS, AND FUTURE WORK.....	66
Limitations	66
The Next Step.....	68
Applications.....	71
LIST OF REFERENCES	73

LIST OF FIGURES

Figure 1: Sample Peer Review for Abstract and Title	59
Figure 2: Sample Peer Review for First Complete Draft.....	60

LIST OF TABLES

Table 1: Country of Origin of Journal Articles, Books, and Patents Abstracted in Chemical Abstracts (% of total number of abstracts; * includes data for the Entire British Commonwealth; Valiela 2001).....	5
Table 2: Language Used in Journals Abstracted in Chemical Abstracts (% of total number of abstracts; Valiela 2001).....	5
Table 3: Course Schedule Weeks 1-8	64
Table 4: Course Schedule weeks 9-16.....	65

LIST OF ACRONYMS/ABBREVIATIONS

CBI – content-based instruction

ESL – English as a second language

IEP – intensive English program

TESOL – teaching English to speakers of other languages

TOEFL – Test of English as a Foreign Language

CHAPTER 1: INTRODUCTION

The United States has one of the most highly regarded university systems in the world, and as a result universities in this country have become attractive to foreigners seeking higher education from reputable institutions. Enrollment of foreign students is not limited to the stereotype of Asians in engineering and math departments – the University of Central Florida's Department of English, for example, recently awarded a Masters in Creative Writing to a Columbian student – but the nature of technical programs tends to create for an intersection of two factors that can be inhibiting to academics: poor English language skills of nonnative speakers and little or no training in the areas of technical and academic communication. This combination of factors can create significant issues at the graduate level, where the ability to publish academic papers has a massive influence on a student's ability to transition from a Master's program into a Ph.D. program and from a doctoral program into a tenure-track teaching position.

With that in mind, this research seeks to address this issue by investigating ways of developing a pedagogy for teaching academic writing to nonnative graduate students of technical disciplines. Once developed, these new pedagogical applications can then serve as the groundwork for designing a course that would result in the production by

each student of a scholarly journal article of publishable quality, and an outline of such a course is included in this thesis.

The Target Student and “Publishable Quality”

This research will only seek to work with nonnative graduate students of technical disciplines, but to produce a paper of publishable quality, these students will need to have conducted research of their own that they wish to communicate to others in their field. This presents an obvious difficulty in assessing “publishable quality,” as the quality of the paper will always be limited by the quality of the research. With that in mind, the phrase *publishable quality* throughout this thesis will refer to quality from a language and presentation perspective only.

One possible way to assure that students will be ready to draft a research paper is to emphasize in the course description the importance of having conducted research prior to beginning the class. Enrollment in the course would also require students to have completed at least one of these items:

- one semester of guided research or independent research
- two semesters of work as a graduate research assistant
- 27 hours (three full-time semesters) of graduate course work

Students who do not meet any of these requirements would need specific permission from the instructor to enroll, and that permission would only be granted to students who can provide convincing evidence of having conducted publishable research

in the form of a one-page summary of the research with a signed endorsement from a faculty member from the student's department.

The Gold Standard

Ivan Valiela (2001) notes that a given research effort “might be the best science in the world, but it is of little consequence unless we complete the second half of doing science: telling somebody else what we found, in clear and convincing fashion.” Publications are the golden currency of the scientific industry. Jobs, promotions, and grants are awarded based on productivity, and the primary measure of that productivity is based on the number of papers the person in question has published in refereed academic journals.

The practical usefulness of improved writing skills, however, is not limited to career advancement alone. As Valiela argues, the research itself can benefit from improved writing skills specifically because it forces the researcher to state her ideas clearly in her own mind:

“[U]nless we tell others effectively about our results, even the greatest science results are to little avail. Moreover, I am convinced that making effort to achieve clarity of expression in text and data presentation improves the authors' own understanding of the science they do. Conveying complex results of science to an audience requires attention to the core meaning of our data...”

Experienced instructors in the humanities often find themselves explaining to students that their clouded writing tends to be a sign of clouded thinking, that they can't communicate effectively because they do not have a solid understanding of what it is they are trying to communicate. As Valiela argues, this axiom applies equally well to technical documentation. The process of choosing words and organizing sentences can be influential in researchers' abilities to understand how ideas and conclusions are connected to other ideas and conclusions, be it their own or those of other researchers.

The Lingua Franca of the Scientific World

The story of how English came to be the dominant language of the international scientific community is both long and interesting, but it's worthwhile to briefly note the three major factors that have contributed to the proliferation of the language. First, the English Empire spread the language across the globe as part of its effort to maintain control over its colonies. Then, at the end of World War II, the United States was left as the only Western power that still had a completely intact scientific and academic infrastructure, which spawned a massive influx of students from developing nations attending U.S. universities. This effect on the spread of English was then further enhanced by the development of computers and early computer programs that used English-like languages, such as Basic and FORTRAN, which produced outputs in English or in English-like formats (Kaplan 2001).

Regardless of how English came to be the primary language of international science, remarking on it is, as Ulrich Ammon (2001) muses, "a trivially obvious insight."

To put some perspective on how accepted this fact is in non-English speaking countries, there are dozens of Brazilian academic journals – including titles such as *The Journal of Brazilian Chemical Society*, *The Brazilian Dental Journal*, and *Brazilian Journal of Genetics* – that only publish articles written in English (Menezes de Oliveira e Paiva and Pagano).

Table 1.1 shows the countries of origin of journal articles, books, and patents abstracted in *Chemical Abstracts* at different times in the 1900s, and Table 1.2 shows the languages used for abstracts at different times across the second half of the century.

Table 1: Country of Origin of Journal Articles, Books, and Patents Abstracted in Chemical Abstracts (% of total number of abstracts; * includes data for the Entire British Commonwealth; Valiela 2001)

Nation	1909	1951	1994
United States	20.1	36.6	29.9
United Kingdom	13.4*	17.4*	5.5
France	13.2	6.2	4.4
Japan	0.3	9.1	12.7
Others	53.0	30.7	47.5

Table 2: Language Used in Journals Abstracted in Chemical Abstracts (% of total number of abstracts; Valiela 2001)

Language	1961	1978	1994
English	43.3	62.8	81.9
Russian	18.4	20.4	5.2
German	12.3	5.0	1.5
Japanese	6.3	4.7	4.2
Other	19.7	7.1	7.2

Interestingly, the number of articles from non-English-speaking countries actually increased throughout the century, while the number of articles printed in English rose dramatically. This would seem to be an indication that the spread of English as the language of science is not simply a matter of Anglo-Americans bullying the rest of the world out of the picture, but rather that researchers around the world have accepted the need for a single common language that can serve as the medium for communicating empirical knowledge.

Such widespread acceptance of English as the *lingua franca* of science is ultimately the strongest argument for the need for the current research effort. If English is the international language of science, the scientific and academic communities would do well to safeguard the integrity of scientific communication by ensuring that those who give and take from the ever evolving body of scientific knowledge do so clearly and efficiently. This research effort seeks to address that by training scientists and engineers in the craft of technical and academic writing. The increased efficiency would leave them with more time and energy to conduct their research, and the increased clarity would allow more people to benefit from and build on that research.

CHAPTER 2: REVIEW OF THE LITERATURE ON PLAIN LANGUAGE AND SCIENTIFIC WRITING

With clarity being the primary problem at hand for nonnative speakers seeking to communicate complex ideas in English, it stands to reason that plain language has a role to play in solving that problem. With that in mind, this chapter will engage in an in-depth review of literature on academic writing with a particular focus on plain language. The review will begin with a discussion of what specifically the term *plain language* refers to – if in fact it refers to anything specific at all – and then will examine which plain language strategies are most relevant to nonnative graduate students of technical disciplines. The chapter will then close with a look at some general resources on writing academic and scientific papers.

What is Plain Language?

Jacqueline Dorney, in her article “The Plain English Movement,” gives an overview of what the status of plain language was in the mid 1980s and how it got there (Dorney 1987). She reveals that plain English started to take hold during the consumer

movement of the 60s. As a result, presidents Richard Nixon and Jimmy Carter both took up the cause of making government documents easy to understand. Dorney notes that several states had passed plain English laws and that most of those laws focused on limiting sentence length in some government documents.

Beth Mazur (2000) reviews a number of current and past resources concerned with plain language and the plain language movement. Mazur begins by defining the term *plain language* in a couple of different ways and explaining the goal behind the plain language movement. She then briefly discusses the origins and purpose of plain language, and then she answers several common criticisms of it. Among the allegations she refutes are that plain language "dumbs down" text, that plain language is not backed up by research, and that plain language relies on readability formulas that may not be valid.

One of the definitions Mazur provides is from Erwin Steinberg: "language that reflects the interests and needs of the reader and consumer rather than the legal, bureaucratic, or technological interests of the writer or the organization that the writer represents." While this definition can safely be called accurate, simply emphasizing the importance of taking the audience's needs into consideration does little to improve our understanding of how to address those needs. The rest of this chapter will look at specific strategies associated with writing clearly in an effort to discover some definite approaches to helping address the needs of an audience.

In the Beginning...

Rudolf Flesch might justifiably be called the father of the plain English movement. In one chapter from *The Art of Readable Writing* (1954), he discusses the results of writing in a “plain style.” Flesch, among the original advocates of plain language, begins by refuting the idea that while plain language may appeal to a less educated audience, it runs the risk of alienating more educated readers. Flesch claims that readers generally choose to read material that is one level less difficult to read than they are capable of reading – college graduates, for example, generally read high school-level literature. He backs up this claim in the text with some less-than-scientific examples, but his endnotes also name dozens of research publications that support his assertion. Flesch then follows with some comparisons of passages written in plain style with passages of similar content written in “conventional” style. For each comparison, he also gives his “reading ease score” for each passage.

Flesch’s side-by-side comparisons of plain text versus conventional text are very persuasive on a qualitative level, and his reading ease scores (based on sentence length and word length) add a quantitative element to his argument. His comparison of two high school history texts leaves room for criticism because the content presented in each passage does not match up perfectly. The more complicated passage, while harder to read, provides a much more complete explanation of the topic. Flesch’s rewritten excerpts of an insurance policy and an abstract of a proposed law, on the other hand, leave little room for counterargument. Another possible criticism could be directed at the formula used for deriving the reading ease scores, as there is a great deal more to readability than word size and sentence length. However, the qualitative evidence is so

overwhelming that Flesch's argument does not need air-tight corroboration by the quantitative evidence.

Going backward eight years to the fourth chapter in *The Art of Plain Talk* (1946), we find a more detailed discussion by Flesch on sentence length. Early in this chapter, Flesch acknowledges that complex sentences can be clear and easy to read when executed correctly, but he laments that knowing how to write such sentences requires a significant amount of skill. He then goes on to advise that, in the absence of such skill, writers are better off keeping their sentences short. Flesch closes the chapter with a table that shows how average sentence length relates to reading ease – 11 words is easy, 17 is standard.

Flesch reveals something in this chapter that may be counterproductive to his goals: He implies – not so subtly – that his principles apply primarily to poor writers. As he says, skillful writers can put together stylistically mature complex sentences and maintain clarity. However, he gives no further discussion to this idea and goes straight into his endorsement of short sentences. This tells readers two things. First, Flesch assumes that they are not skillful writers, but more significantly, he also assumes that his readers do not have the capacity to become skillful writers. If he felt they did, he would not be so intent on steering them away from sentence complexity. As a result, readers who have lofty goals for their writing might be turned off by Flesch's dismissal of them.

Robert Gunning (1971), one of Flesch's contemporaries, offers similar advice about sentence length, but Gunning is more careful to address the obvious counterarguments. In response to technical communicators who cite longer sentences of great fiction writers, Gunning reminds us that technical communicators are writing for

engineers and manufacturers, not for a place in history. Further – and this is where he separates himself from Flesch – Gunning emphasizes that what he recommends is a short *average* sentence length. He goes on to encourage writers to vary the length of their sentences to avoid boring prose, but to shoot for an average length of about 20 words per sentence across a given piece of writing. Gunning supports this principle by looking at the prose of a successful fiction writer known for his long sentences. He quotes a 91-word sentence from Thomas Wolfe’s *You Can’t Go Home Again* and then points out that the average length of the sentences on that page is only about 22 words.

Gunning further qualifies his endorsement of short sentences by describing some situations in which longer sentences are clearer than their shorter alternatives. Most of these examples are cases where several common words replace one or two words that the audience is likely to find obscure. Gunning then provides a couple of examples of long sentences from Ernest Hemingway’s *A Farewell to Arms* and E.B. White’s *Stuart Little*. Gunning explains that these long orations are clear because the authors use words that are “concrete and specific,” a point that several of the works reviewed in this chapter revisit. Of course, Gunning might have done better to use at least one example from a technical document, but his point still comes across.

William Schutte and Erwin Steinberg address a similar issue in “Wasteful Prose” (1960). Rather than focusing on sentence length, Schutte and Steinberg advise business writers to simply avoid using more words than necessary. They specifically guard against providing the audience with more information than they need, and they suggest avoiding what they call “heavy phrasing” – using several words when few will do or using unusual vocabulary instead of more commonly used words – and “heavy

connectives” – using phrases like *due to the fact that* instead of simply *because*. They follow this discussion with an extensive list of heavy phrases and excessively elegant words along with more effective alternatives.

Schutte and Steinberg’s ideas about heavy phrasing and connectives speak directly to some core principles of plain language. Interestingly, in their discussion of wastefulness, Schutte and Steinberg do not once address sentence length, though many of the tips they offer would inherently lead to shorter sentences. Whether this is because they want to avoid Flesch’s mistake of slighting the reader or, more likely, because they simply had other ideas that they want to emphasize, Schutte and Steinberg do well to advance the cause of clarity without expecting their audience to give up any hope of achieving “stylistic maturity” (a phrase I have taken from Michael P. Jordan, whose work we will take a look at in the next section).

In “Telling ‘em Straight,” R.G. Ralph (1952) cites three key axioms for clear and direct writing: use active voice as often as possible; use finite verbs as often as possible; and use abstract nouns as rarely as possible. Like Schutte and Steinberg, Ralph does not fall into Flesch’s tunnel vision for short sentences. However, Ralph makes it clear that he does not see stylistic maturity as a significant concern, for he asserts (with little explanation or evidence as support) that simply following his axioms and producing prose that is clear, brief, and direct will naturally lead to a pleasing style. Other authors whose work will be discussed later in this chapter, such as Joseph Williams, would likely disagree, but as simplistic as Ralph’s assertion about style may be, one could argue that following Ralph’s axioms would lead a writer to produce prose that at least is not terribly displeasing stylistically. Still, writing that is not terrible is only a first step, and this

attitude throws Ralph into the same trap that Flesch digs for himself by not trying to lead his audience to something more than writing that is barely good enough.

The Great Here and Now

Jumping ahead to a more modern publication, Elizabeth Danzinger still focuses on the same ideas in her advice book for business writers, *Get to the Point* (2001). She begins a section on expressing complex ideas by emphasizing that the more complex an idea is, the more simple a writer's description of it should be. Then she throws out three tips: (1) avoid technical jargon; (2) write sentences of fewer than 15 words; and (3) do not use one complex idea to explain another one. Danzinger provides little in the way of explanation or examples for her three tips, though later in her book she does offer some well worn ways to simplify sentences, such as "use the active voice" and "don't dangle your modifiers."

Some 50 years removed from Ralph and Flesch, Danzinger fails to avoid the same pitfalls that we see in *The Art of Plain Talk* and *Put it Plainly*. By oversimplifying her discussion of language, she runs the risk of alienating readers who want to be more than passable writers. Further, even with publications like Gunning's available for her to draw on, Danzinger is guilty of the same short-sentence tunnel vision that may have limited Ralph and Flesch's works.

In an article published in the *Journal of Technical Writing and Communication*, Michael P. Jordan (1994) seeks to present technical writers with ways to paraphrase complex noun phrases to aid in their efforts to edit or rewrite text into plainer language. Jordan approaches the issue by dividing complex noun phrases into two major groups:

those that appear at the start of the sentence and those that appear elsewhere in the sentence. For each group, Jordan identifies over a dozen techniques for reducing the complexity of complex sentences. The majority of the techniques he discusses involve converting the noun phrase into an independent clause, thus allowing the writer to split the original sentence into two simpler sentences. Jordan also discusses some instances in which the complex noun phrase can be shortened or made less formal by converting it into a conditionally or temporally subordinated clause.

This article does well to identify and attempt to address an element of technical communication that can present significant comprehension difficulties for readers, though Jordan's techniques are less than revolutionary and some are of questionable merit. Jordan himself admits that many of his examples are no better than the original sentences they paraphrase, and he goes out of his way to point out that many of his techniques involve sacrificing "style maturity," as he calls it, for readability. While having these examples available as a reference can certainly be useful to technical writers, Jordan missed an opportunity to truly break new ground in this area by not conducting research that tested each technique individually to determine which ones are truly effective at improving comprehension across different kinds of audiences.

In *Technical Editing*, Carolyn Rude (2002) addresses several issues associated with plain language. She asserts that sentences structured in a subject-verb-object pattern are usually easier to understand than sentences that follow a subject-verb-complement pattern, which also implies a preference for action verbs over linking verbs. Rude goes into greater detail about structuring sentences for better clarity, suggesting that writers and editors place the main idea of a sentence in the structural core, use subordinate

structure to subordinate ideas, and use parallel structure for parallel ideas. She also addresses the issue of perceived sentence length, pointing out that issues other than the number of words in a sentence can affect its perceived length – stacked phrases, impersonal subjects, and separation of the subject and verb. Rude is careful to note that forming several consecutive sentences of the same length can decrease readability even if they are all short because the reading will become monotonous and readers will have difficulty staying alert.

The distinguishing feature of Rude’s discussion on editing style for readability is that she does not subscribe to Flesch’s postulate that shorter sentences are always easier to read. While she does acknowledge that in some cases a piece of information can be more easily understood if it is broken down into smaller chunks, she is quick to point out that longer, more complex sentences can sometimes help readers understand the relationships between pieces of information. Rude does not cite any quantitative research to back up her assertions, but she does offer activities to reinforce her ideas and help students understand them.

In *Writing at Work*, Edward L. Smith and Stephen A Bernhardt (1997) tell us that “good” writers usually find a way to insert a degree of playfulness into their writing as part of establishing a personal voice. Smith and Bernhardt then advise writers whose prose is boring and stilted to “lighten up.” They then go on to discuss ways to make prose sound more elegant and identify some situations in which elegance is preferable to playfulness.

Perhaps unwittingly, Smith and Bernhardt offer a subtle argument against plain language in this text. They describe a playful style as being “beyond” a plain style, and

an elegant style being “beyond” a playful style. Exactly what they mean by *beyond* is not clear, but their enthusiastic endorsement of playfulness in writing seems to imply a status that is superior to plainness. Moreover, this may be somewhat of a misrepresentation of plain language, as Flesch and other plain language advocates have always endorsed an element of personality in writing to keep readers engaged and attentive. Granted, Smith and Bernhardt may have intended to refer simply to boring language in general terms and not specifically to “plain English,” but their choice of words – either intentionally or unintentionally – implies that plain is bad and elegance is good.

In the third chapter of *Ten Lessons in Clarity and Grace*, Joseph Williams (2003) presents and explains his two principles of clarity: characters as subjects and actions as verbs. That is to say, Williams holds that the clearest writing usually presents the main characters as the subjects of sentences and their actions as verbs, as opposed to using abstract nouns as subjects and verbs that do not express specific meaning. He provides example narratives as support and then offers some methods to help writers identify problems of clarity in their own writing. Near the end of the chapter, Williams warns against stringing together several short sentences and presents an example of how aligning characters with subjects and actions with verbs can allow sentences to be combined using subordination and coordination without sacrificing clarity.

This text does a superior job of identifying specific patterns that affect clarity, something that is at the very heart of plain language. Williams discusses the impact of sentence patterns on clarity in great detail and challenges readers to think about their writing in a very sophisticated way. The only drawback of Williams’ approach is that it may be too challenging for people who are not used to thinking about their language

choices in such detail. Unfortunately, these are exactly the kinds of people whose writing could benefit the most from plain language approaches.

Sandra Davidson Scott (1993) offers a much less complete discussion on writing in her article “Staying Out of Hog Water: Tips for Writers.” She presents her tips as nothing more than her pet peeves, rather than a complete guide to writing in plain English. Although such articles are common, I have included Scott’s here because she includes one tip that is surprisingly absent from much of the literature: “Avoid anything that impels the reader backwards.” In other words, Scott suggests that writers give their readers “signposts” of sorts to keep them up on what has happened, rather than expecting the reader to remember some detail from several pages back.

Laurel Kay Grove (1988) begins a paper titled “Cross-Cultural Editing” by questioning whether the principles of plain English that apply well to native speakers are also effective at clearly communicating information to nonnative speakers. The bulk of her conclusions are based on two surveys that Grove concedes are not scientific. The first is an editorial review of 14 articles written in English by Japanese authors; the second is a set of interviews with five Japanese professionals living in the United States. Grove discusses some of the problems associated with writing in plain English for nonnative speakers, noting that what Americans see as direct and easy to understand may be confusing or even offensive to people who have learned English as a second language. She then describes her surveys and their results, noting that the subjects had the greatest problems with the use of articles, verb forms, noun number, and prepositions.

This article’s greatest strength is its identification of issues associated with native Japanese speakers reading English. Grove postulates that her conclusions can also apply

to nonnative English speakers in general, but while such an assumption may be true for speakers of other East Asian languages, applying that assumption to, say, speakers of European or African languages might be a bit of a stretch. Interestingly, though Grove begins the paper with skepticism about the use of plain English, she concludes that plain English was in fact the best way to address the problems she identified as being most common. The suggestions she offers include keeping sentences simple, avoiding piling up subordinate clauses and overusing pronouns, and keeping verb forms active. She fails, however, to identify any core principles of plain language, like using idioms, that may not be effective at dealing with cross-cultural audiences.

In an extremely relevant article, Emily Thrush (2000) takes a look at the implications of plain language principles and simplified writing for nonnative readers of English. Specifically, Thrush wonders if the same techniques that are used to make documents easier for native readers to understand also help the comprehension of nonnative readers. She tested two of these techniques: the preference for Germanic vocabulary to Latinate vocabulary and the use of phrasal verbs. She found that Latinate vocabulary works better for speakers of Romance languages and that phrasal verbs actually hinder the comprehension of nonnative speakers.

Thrush's finding about phrasal verbs offers insight on how nonnative writers are likely to have difficulty applying the use of phrasal verbs. Many plain language resources advise using idiomatic expressions such as *speed up* in place of *accelerate* and *lined up* in place of *aligned*, but while this might appeal to a less educated native writer, Thrush shows that nonnative speakers are more likely to struggle with such an approach.

Drafting a Scientific Research Paper

Unsurprisingly, most resources that specifically address the process of drafting a scientific paper make at least some reference to writing tips that could be categorized under the “plain language” label (Valiela, 2001; O’Connor & Woodford, 1976; Collier & Toomey, 1997; Trelease, 1969). Like the plain language resources already discussed, scientific writing sources disagree on some of the particulars of how to communicate clearly, but they tend to agree that clarity should be assigned the highest priority. Similarly, scientific resources tend to agree on the basic elements of the writing process that apply to most kinds of writing – planning (especially developing an outline), drafting, and revising – and they agree on the four major sections that usually make up a scientific paper: introduction (or background), methods (or methods and materials), results (or findings), and discussion (or conclusion).

The literature does show some disagreement on how to approach the drafting process. Specifically, there is some disagreement on whether a writer should write from front to back – abstract, introduction, methods, and so on – or whether it is best to first write the results section and then develop the other sections. O’Connor and Woodford (1976) argue that writing the abstract first should be relatively easy so long as the author has worked out the conclusions and how they relate to other work on the same subject. If the author has not established what the paper is to convey clearly in his or her mind, O’Connor and Woodford argue, then drafting the abstract will help to define it for the author.

Valiela (2001) argues that, as data is “the heart of a science paper,” the results section is the natural place to begin. He suggests that an author line up the data and determine what he or she wants to say about it. Once the author determines what data will be presented and how it will be analyzed, the structure for the methods section is clear – it needs to present an explanation of how the results were obtained. This will in turn provide a road map for the introduction, which will discuss the context and literature that motivated the author to collect the data. Collier and Toomey (1997) similarly argue that leaving the introduction for last allows the writer to fit the generalities of the introduction to the specific findings of the research rather than trying to find a way to make the findings explain the generalities.

There is no “right” approach to drafting a scientific paper that fits everybody, but chapters four and five will discuss which fits best in the context of an academic writing class for non-native graduate students of technical disciplines.

CHAPTER 3: REVIEW OF THE TESOL LITERATURE

This chapter will continue to look at current literature that is relevant to teaching academic composition to nonnative graduate students of technical disciplines but will shift its focus from the composition itself to the instruction of composition, especially as it relates to nonnative students. A brief discussion of the assumptions and thought processes of inexperienced TESOL teachers will introduce the review, followed by a look at the polarizing theories that the top researchers in the field of second-language acquisition have been debating for the past three decades. The chapter will then engage in a discussion of content-based instruction (CBI), which is at the center of current TESOL practices, and will then touch on other key issues, including language anxiety, collaborative writing, scaffolding strategies, grammar instruction, and the integration of the various tools and skills relevant to advanced academic composition.

Assumptions to Guard Against

Mark Warford and Janelle Reeves report on a qualitative study into the preconceptions that novice TESOL teachers may have in a 2003 article from *Teachers and Teaching*:

Theory and Practice. Warford and Reeves conducted long interviews with nine subjects enrolled in a TESOL teacher education program. Six of the subjects were native English speakers, and three were nonnative speakers. Among their conclusions, Warford and Reeves identified a system of language teaching-related metaphors and a greater influence of an apprenticeship of observation in nonnative speakers than in native speakers.

Warford and Reeves' research does not lend itself to reaching any definitive conclusions (which they acknowledge), as they only spoke with nine subjects, all of whom were enrolled in the same TESOL teacher education program, and they did not triangulate their findings with any other forms of data other than the interviews.

However, their discussion about apprenticeships of observation serves as a warning to a native English speaker designing an advanced writing course for nonnative students. The native English speaker's assumptions born from his own learning experiences in writing may not apply to non-native speakers.

Krashen and his Critics

Stephen D. Krashen of the University of Southern California may be the most recognizable name in the fields of literacy and second-language acquisition. His theories on how we “acquire” rather than “learn” language, which he outlines in *The Natural Approach: Language Acquisition in the Classroom* (Krashen & Terrell, 1983), have set the groundwork for much of what is now regarded as modern wisdom among teachers of English as a second language. A close look at this modern wisdom will follow in the

next section, but it is important to note that the top minds in the field still debate one of the most basic of Krashen's principles, that the effects of direct grammar instruction are "peripheral and fragile" (Krashen 1992, p. 409; 1993, p. 725), and that second-language teachers are better off spending that class time engaging students in language practice, which will help them naturally acquire the language they are practicing. Krashen does, however, acknowledge that "learned" competence – knowledge of form gained from direct instruction – does play a role in second-language learners' ability to edit that which they have already produced.

Krashen's work in this area has been instrumental in bringing TESOL practices to where they are today, but he has been the target of a great deal of criticism from contemporaries such as Kevin Gregg (1984) and Patsy Lightbown and Manfred Pienemann (1993). While Krashen's critics generally agree that his theories with regard to language acquisition have a great deal of validity to them, he has been criticized for a willingness to apply his theories to a wider scope than the empirical research justifies (Gregg, 1984) and for his quickness in dismissing studies that seem to contradict Krashen's assertions about grammar instruction (Lightbown & Pienemann, 1993). Ultimately, Krashen's absolute statements that seem to occasionally defy common sense (in Gregg's view) and teachers' experiences (in Lightbown and Pienemann's view) tend to limit the willingness of teachers and researchers to fully endorse Krashen's conclusions.

Modern TESOL Thought and Practice

R.R. Jordan's book *English for Academic Purposes: A guide and resource book for teachers* (1997) offers a comprehensive overview on the field of English for Academic Purposes, ranging from needs analyses, to evaluation methods and materials, to syllabus design, to lecture tips. The title is somewhat misleading in that it is more of a resource than a guide because the text seems more focused on presenting teachers with options than on guiding them to any specific choices. The most relevant of the options presented is a learning-centered approach to needs analysis which differentiates between "target needs" (what the student will need to be able to do) and "learning needs" (what the student needs in order to learn). The former prompts questions like "Why is the language needed?" while the latter concerns itself with questions like "Who are the students and what resources are available to them?"

This approach to needs analysis creates a framework that allows for two very different but very necessary perspectives in preparation for servicing students. It would be foolish to try to address a very specific learning situation (i.e. academic writing for nonnative graduate students) with pedagogical approaches designed to be applied across a broad range of situations. Asking questions that look at the specific learning needs and end-goals of a course can be a useful tool in preparing a syllabus for a course intended to address a specific learning situation.

Content-Based Instruction

Loretta Kasper provides an overview of the theories and principles behind content-based college ESL instruction in the opening essay of an anthology aptly titled *Content-Based College ESL Instruction*. Kasper briefly explains Krashen's Comprehensible Input Hypothesis, Cummins' Two-Tiered Skill Model, and the Cognitive Learning Theory, and she discusses how applying these theories to second-language acquisition turns reading and writing into cognitive tasks. Kasper then describes several instructional models around which a content-based course could be designed, including different kinds of interdisciplinary models and a model for a self-contained content-based course. She closes by discussing assessment methods for content-based second-language instruction, emphasizing the importance of highly contextualized assessment tasks.

The great strength of Kasper's ideas for content-based instruction is that they can be tailored to fit a wide range of language abilities, which is likely to come up in a class full of graduate students of technical disciplines. Kasper's emphasis on improving language skills through critical thinking exercises presents a clear strategy for helping students break through from conversational competence to academic elegance. This is closely related to Krashen's Input Hypothesis, which states that learners acquire language when exposed to "input" that is one step beyond their current level of linguistic competence (Krashen, 1985). However, many of the assessment methods that Kasper mentions – and there are many – would not apply to a course that is focused primarily on producing an academic text rather than on holistic language improvement.

In a 2003 article from *TESOL Journal*, Todd Heyden discusses his experiment with assigning one long text instead of several short ones to his first-year ESL students at

Pace University. Heyden had previously assigned pieces from an anthology of essays about rhetoric, but he found that this disjointed approach generated little student interest and, more to the point, did not motivate students to do much writing. In an effort to remedy this problem, he assigned a novel that the students read over the length of the semester at a pace of about 50 pages per week, and he found that using a single text made writing easier for the students, partly because it maintained a clear context for their writing. Heyden's writing assignments consisted of journal entries and a research project, both of which showed marked improvement over classes that read several shorter texts.

Heyden's idea of focusing on a single long text could translate, at least partially, to a class for nonnative graduate students of technical disciplines. The nature of the text would likely have to be more academic, as the students would need to be exposed to models of academic language if they are to produce high quality academic documents of their own, but the basic principle of using one long text could still apply. Similarly, some shorter texts would likely still have to be incorporated into the curriculum as examples of the types of academic journal articles that the students will be expected to produce.

Complementing CBI

Peter Master (2000) examines methods of addressing grammar in a college ESL course that engages in content-based instruction in his essay “Grammar in Content-Based Instruction.” Master notes that the Krashen-led anti-grammar stance of the 1980s has resulted in texts developed for content-based language instruction that put very little focus on grammar. This creates a situation in which only a limited range of grammatical items are covered and limited explanations are given for those items that are covered.

Master then cites several studies that indicate that L2 students expect and want more direct instruction on grammar and vocabulary and argue that incidental acquisition of form is too slow and inefficient. Master's solution is to keep content first, but to make sure that the content is used to address a full range of grammatical items and that those items are fully explained, though he admits that the depth of explanation may have to depend on how advanced the class is.

Master's desire to fully explain grammatical concepts that even native speakers often have trouble understanding may seem rather ambitious for a lower level class, but it may fit well with a class composed of graduate students who already have the language skills necessary for success in their technical curriculum and are looking to advance their skills enough to be able to communicate their research in the form of an academic paper. Master's ideas may be the answer for students whose incidental acquisition of form cannot keep pace with their technical achievements within their disciplines, though it's worth noting that the studies that Master cites contract a great deal of empirical evidence produced by Krashen and others who see grammar instruction as an inefficient use ineffective use of class time. This is an unsettled debate, and chapter 4 will discuss how to take advantage of Master's ideas without completely disregarding Krashen's conclusions.

In a 1999 article from *TESOL Journal*, Fredricka Stoller proposes an approach to teaching English for academic purposes in an intensive English program (IEP) that combines discrete-skills instruction with content-based instruction. Stoller suggests that IEP courses, which by definition span 20-30 hours per week, be split into one core content-based course that consumes about 10 hours per week and several support courses

(e.g. reading lab, writing tutorials, intercultural communication) that each take up 2-4 hours per week, with the assumption that all courses support vocabulary and grammar improvement. Stoller argues that such a design is better suited than a classic discrete-skills approach for addressing EAP students' three primary needs: language skills, academic skills, and acculturation skills.

Stoller's structure for an IEP course does not have a practical translation that applies to a course for technical graduate students that would not be nearly as intensive in terms of instruction hours per week, but her hybrid approach to EAP instruction can apply. Technical graduate students would still have the three basic needs to be met – though language and academic skills would take a much higher priority as they are the most relevant to producing an academic research paper – and a discrete-skills approach by itself fails to take advantage of some of the benefits of content-based instruction, such as the elimination of the artificial separation of language instruction and subject-matter texts.

In a 1997 article from the *Journal of Teaching Writing*, Nancy Burkhalter provides a thorough analysis of the benefits and drawbacks of three types of grammar instruction: traditional, sentence combining, and functional/inductive. Burkhalter plots each of the three methods on a graph with "Analyzed Knowledge" measured on the horizontal axis and "Cognitive Control" measured on the vertical axis, with traditional grammar in the upper-right (high CC and high AK), sentence combining in the lower-left (low CC and low AK), and functional/inductive grammar in the lower-middle (low CC and medium AK). She then discusses the implications of the levels of cognitive control and analyzed knowledge associated with each method and, using these implications, she

determines which methods work best for which students and situations. Specifically, she decides that traditional grammar is best for adults learning a second language, people who need to be able to analyze language (teachers, editors, writing professionals), and advanced writers needing editing skills; sentence combining is best for novice writers, advanced second-language learners, and those needing to sophisticate their writing; and functional/inductive grammar instruction similarly works well for novice writers and advanced second-language learners, and it also is well suited for native speakers who do not speak a non-standard dialect.

In terms of grammar instruction that is not limited to ESL classes, the unique strength of Burkhalter's study is that she is more interested in tailoring methods to fit students' individual needs rather than promoting a one-size-fits-all approach. However, the obvious drawback from a TESOL perspective is that she designates all three methods as being good for second-language learners (Krashen, meanwhile, would likely designate them all as being of extremely limited usefulness to second-language learners). She differentiates between a method that works well for "adults learning a second language," and the other two that are good for "advanced second-language learners." It is not clear, however, how she defines these differences in the learners. That is, which method would work best for advanced learners who are also adults? Burkhalter does not answer this directly, but she does note that a strength of both sentence combining and functional/inductive grammar is that they tap in on native speakers' implicit knowledge. As traditional grammar does not rely on this as a strength according to Burkhalter, one might infer that traditional grammar instruction is better suited for nonnative speakers who are already well into their graduate curriculum.

A 2003 article by Dorota Zielinska from the *Journal of Technical Writing and Communication* describes a technical writing tutorial that preceded an advanced ESL class for students of English Philology at the Jagiellonian University in Poland. The tutorial aimed to familiarize students with typical stages of a professional writing process: situation analysis, gathering information, structuring content, writing, revising, and testing. At the end of the course, Zielinska found a statistically significant improvement in the writing performance of students who had taken the tutorial in comparison to a control group that spent the same time doing more traditional ESL exercises.

Zielinska is not specific about what she means by "traditional ESL exercises," making it difficult to jump fully on board with her conclusion that technical writing books and journals should be considered important sources for teaching writing to ESL students. However, her apparent success with engaging English philology students in technical writing exercises, such as writing instructions for making a paper airplane and organizing a table of contents, seems to imply a possibility for even greater success with graduate students of technical disciplines. Such activities would likely fit best in the early weeks of the course to get students thinking about technical writing principles while they continue through the content-based instruction that would take up the bulk of the class.

Margaret Moulton and Vicki Holmes discuss some methods of wrapping together all the different strategies and approaches that can be involved in second language learning. In a 2000 article from *TESOL Journal*, they describe a 16-week "capstone" course at the University of Nevada designed to integrate research and technology skills that the authors feel are necessary for students' future academic success. Those skills

include using computers, using electronic databases and Internet sources, reading scholarly journals and books to find secondary sources, creating graphics and spreadsheets to display data, developing research instruments (e.g. surveys, questionnaires) for primary research, and developing research writing skills. Students are taught these skills recursively, with the final objective being to use them to produce a five-page research paper by the end of the course. While compiling their research, students begin organizing a linear outline and later engage in peer and teacher conferences as they work on their drafts, and they give oral presentations of their research in the final days of the class. The course was taught for four semesters and evaluated through interviews with students once they had completed two years of work toward their majors, and their reflections seemed to confirm the value of the course in research, writing, and computers.

Moulton and Holmes' capstone course takes place before students enter the academic mainstream, which contrasts with this research effort, which seeks to develop a strategy for teaching academic composition for students who have already completed a significant amount of mainstream course work. Yet, although linear outlines and peer and teacher conferences are devices often used in composition classes for native speakers, Moulton and Holmes seem to have shown that these devices also work well for nonnative speakers, meaning that they could also prove useful for nonnative speakers who are further along in their academic careers and who are engaged in the production of more advanced academic texts.

Mary Ellen Kerans' paper "Simulating the Give-and-Take of Academic Lectures" (2003) emphasizes the importance of interactivity between teachers and students in a

TESOL classroom and offers strategies for promoting such interactivity. The article begins by citing a pair of studies that suggest that interaction between teacher and students enhances comprehension for those students who engage in it, while students who do not participate as much tend to not just fail to take advantage of the extra learning opportunity, but also become additionally confused by the apparent random approach that some interactive teaching sessions tend to take. Kerans then discusses some slight changes that her team of English instructors at a university in Spain have made to their lecturing methods in an effort to promote more interactivity. Among the notable changes were to emphasize that no lecture would be given twice but to tell students that any of them can ask questions or interrupt in order to check comprehension. Kerans also notes that she instructs students not to ask her to repeat herself, but instead to use a phrase along the lines of "you mentioned..." followed by the student's interpretation of what the instructor said.

Kerans does well to identify an issue that can arise when students come to universities in the United States from cultures that do not encourage extensive student-teacher interaction. Addressing this issue is important because, as Kerans notes, teacher-student interaction creates a context for speaking in classes that might otherwise focus on reading and listening, and such interactions provide students with opportunities to negotiate meaning without relying strictly on reading and listening. Taking this a step further, though Kerans does not say as much explicitly, her ideas seem to strongly endorse a Socratic style for content-based instruction.

Addressing Anxiety

Shinji David Kondo and Yang Ying-Ling (2004) conducted a study that examines how students in an ESL classroom in Japan cope with language anxiety. The researchers surveyed over 200 students at a Japanese university and separated their coping strategies into five categories: Preparation (e.g. studying), Relaxation (e.g. taking deep breaths), Positive Thinking (e.g. trying to “enjoy the tension”), Peer Seeking (e.g. speaking to other students of similar abilities), and Resignation (e.g. giving up). The results showed Preparation to be by far the most common strategy (60.4%), followed by Resignation (28.3%) and Positive Thinking (26.2%). The percentages do not total 100 because students were permitted to report multiple strategies.

Different cultures can be expected to react to anxiety in vastly different ways, so we should be careful not to generalize too much from these findings. However, the overwhelming percentage of students who responded in the Preparation category should not be ignored either. Graduate students who are accustomed to success in their technical disciplines may have difficulty dealing with language anxiety, and instructors will need to be sensitive to this. In the absence of further empirical data on this subject, an instructor could at the very least give students opportunities to read in advance and suggest extra reading for those who, like many of the respondents in Kondo and Ying-Ling's study, seek to alleviate their anxiety with increased preparation.

Another potential means of alleviating students' anxiety is to provide them with appropriate structured support, or “scaffolding.” Sarah Cotterall and Robin Cohen (2003) published a paper in *ELT Journal* that describes a 12-week course on English for academic purposes that guided students through the process of producing their first two

academic essays in English. Both were argument papers, and each consumed six weeks of the course. Cotterall and Cohen incorporated the concept of scaffolding into their approach to teaching the academic writing process by creating supporting conditions that allowed students to extend their existing skills and knowledge to higher levels of proficiency. They did this by providing students with a predetermined essay structure, focusing on one section of the paper in each weekly three-hour session, modeling the composition process for each section, and assisting them in locating appropriate texts and data. This kind of support, Cotterall and Cohen argue, frees students to focus on the language and structure needed to produce an argument paper, and the authors provide samples of students' writing and evaluations to back up their claim.

The evidence that Cotterall and Cohen provide to endorse the effectiveness of their approach is purely anecdotal, but they do well to explain how the scaffolding approach reduces the learning burden on students and allows teachers to focus on the areas of greatest need. Such a strictly prescriptive approach would be difficult to coordinate in a class of technical graduate students whose different research efforts would by their natures require different structures, but some sections like abstracts, introductions, and conclusions could still be focused on and modeled in individual sessions. On the other hand, other elements of the scaffolding approach, such as assisting students with locating appropriate texts, would be difficult to tailor to the broad range of research subjects likely to be encountered.

Alan Hirvela (1999) offers suggestions on collaborative writing that could also help provide further scaffolding and anxiety relief. In his article "Collaborative Writing Instruction and Communities of Readers and Writers," Hirvela advocates broadening our

view of collaborative writing activities in ESL classrooms to go beyond peer review to plural-author activities that involve several students working together to produce an individual piece of writing. Hirvela suggests that classes be broken into small groups that interpret and respond to texts collectively through dynamic discussion and negotiation, and then the entire class critiques the papers produced by each group. He argues that a socially oriented approach to writing makes sense because it emphasizes an often overlooked element of writing – a social dimension concerned with the expectations and demands of the intended community of readers. Hirvela also notes another major advantage to this form of collaborative writing: The dialogue and interaction present students with opportunities to apply their growing L2 knowledge, and the group critiques can be easier for students who come from cultures that do not commonly critique individually produced texts (e.g. East Asia).

As with any collaborative project, Hirvela's idea presents instructors with the problem of having to make sure that the text is in fact produced collaboratively instead of one group member doing the majority of the work while the others tag along. Also, a class that has the objective of having every student produce an academic text of publishable quality will by its nature have to retreat to individual composition at some point, but Hirvela's collaborative activities could serve as useful precursors to the individual composition. A collaborative writing project that is completed in the first few weeks of the semester could help to get students focused on the writing process and to put them in situations where they are thinking about and talking about language and writing strategies. The group critiques might also help reduce some language anxiety and get

students better prepared for how to constructively comment on individually produced drafts later in the course.

One of the most useful suggestions for increasing student participation while accounting for their language anxiety concerns the use of online discussion boards. Dawn Bikowski and Greg Kessler discuss some of the advantages related to using discussion/message boards in ESL classes in a 2002 article from *TESOL Journal*. Bikowski and Kesler note several benefits associated with using discussion boards: They do not require expensive software; only limited technical knowledge is needed; communications can be saved and printed; less vocal students have equal opportunities to participate; time and location are not limiting factors; self-consciousness may be eased in some cases; and more attention can be given to each student. The authors also note that message boards facilitate student collaboration and reflection.

Bikowski and Kessler's ideas about using discussion boards seem to apply especially well to technical graduate students who are often most comfortable when sitting in front of a computer. Discussion boards may prove to be a useful alternative for students who are reluctant to participate in a traditional classroom setting because of language anxiety issues. Posting on a discussion board in an academic format (e.g. responses to assigned reading) would provide useful practice in a class designed to develop academic writing skills, and the enduring nature of discussion boards allows students to revise old assignments as their skills progress over the length of the course.

Giving students a familiar subject matter with which to work is another way to provide support for students while maintaining a reasonable comfort level. Sharon Snyder's article "Foundations of Predictability in LD Literacy Learning" discusses the

usefulness of predictability – the inference of something new or unknown from something that is known or expected – in ESL classrooms. Snyder argues that predictability helps non-native speakers navigate through the fog of ambiguity by using known meanings or reasonable inferences to decipher unfamiliar vocabulary or sentence structures. She lists and offers brief examples of how to use six possible sources of predictability: multiple literacies, previous knowledge, events or experiences of personal importance, narratives, relationships, and aesthetics and ethics. She notes that putting these ideas into use require lesson planning that takes into account not just the subject matter at hand, but also the backgrounds of each individual student in the course.

Snyder's use of predictability seems primarily directed at less advanced L2 learners, but her ideas could easily be adapted for graduate students of technical disciplines because they will all share one common area of interest and previous knowledge – technology. Whereas instructors in basic L2 classes would need at least a few class sessions to familiarize themselves with their students' knowledge backgrounds, an instructor of technical graduate students would be able to come to the first class prepared to take advantage of the one area of common interest and knowledge. This could be a key resource for getting students both motivated and confident early in the course.

CHAPTER 4: DRAWING A MAP

This chapter will look at some of the salient questions and concerns raised by the literature reviewed in chapters 2 and 3 and will examine and answer them to whatever extent is possible. Chapter 5 will then take these conclusions and translate them into specific texts, workshops, assignments, and lectures that could be included in a course for helping technical graduate students write academic papers.

These are the questions that chapter 4 will address:

- How can we balance instruction so as to effect holistic language improvement while maintaining a focus on the end goal of producing an academic research paper of publishable quality in English?
- What types of discussions and assignments are most useful for meeting the goals of the course?
- Which plain language strategies are nonnative students likely to be able to incorporate into their writing effectively and efficiently? Which strategies are unlikely to be helpful to these students?
- How much and what kind of grammar instruction is appropriate?

- Which drafting process serves as the most effective model for nonnative graduate students of technical disciplines?

Striking the Balance

It is important to keep in mind that the students' English language skills will not be starting from square one, as they will have had to have passed the Test of English as a Foreign Language (TOEFL) to gain admittance to their graduate programs, and they will have to have the basic English skills necessary to get through their regular technical curriculum. What's more, the primary purpose of this research effort is not to effect holistic English language improvement, but to give nonnative students the skills they need to produce academic papers of publishable quality.

However, some degree of holistic language improvement will be necessary for most nonnative speakers, as the language skills required for developing a clear academic voice are significantly greater than those needed to pass a class in, say, advanced simulations. This need must be balanced against the need to maintain a strong focus on the primary goal of writing a paper that students can use to communicate their research and advance their academic and scientific careers.

The literature reviewed in chapter 3 indicates that content-based instruction – instruction in which students read and write about something other than language – can be successful at improving language skills and can be tailored to fit different skill levels (Kasper, 2000). Heyden (2003) further argues convincingly that CBI is most effective when taught in a sustained manner, that is, when students are given a single long text to

read over the course of a semester rather than several short texts. This presents an interesting conundrum for the proposed class, the goals of which require some degree of direct instruction on writing academic research papers. It is not enough for students to simply become better at English; they have to learn how to use those new skills for a very specific purpose or the goals of the class will not be met. Fortunately, as mentioned earlier, these students can be expected to have some basic competence in English, and so they will not share the same need for holistic language instruction that basic ESL students would need.

Jordan's (1997) learning-centered approach to needs analysis would categorize the ability to produce an academic paper of publishable quality as a "target need" and the holistic language skills necessary to write that paper as a "learning need." Both of these needs must be satisfied if this class is to be successful, and Stoller (1999) offers a model for satisfying separate target and learning needs in her intensive English program that focuses on English for academic purposes. Her program devoted about half of her class time to CBI and divided the rest of her class time between support courses, such as reading labs and writing tutorials, which focused specifically on academic skills.

Unlike the class proposed in this thesis, Stoller had the luxury of more than 20 hours of class time per week, and she, in turn, did not have the luxury of working with students who had already acquired the minimum English language skills necessary for completing their general curriculum. However, her success in mixing CBI with discrete-skill instruction helps to point the way for the proposed class.

The best approach for teaching nonnative technical graduate students how to write academic papers would be a form of "semi-sustained" CBI, where students are given a

text of some 200-300 pages in length that they will read and respond to over the first half of the semester. The text should be a mainstream publication of a technical nature so as to fit the interests of a broad range of technical students while not giving them the feeling of reading a textbook. This approach benefits from the general language acquisition advantages of CBI that Kasper discusses and should help increase students' motivation and maintain a clear context for their writing as Heyden (2003) observed. The second half of the semester would then follow with journal articles about plain language and writing research papers, just as Stoller's program included reading labs and writing tutorials to address specific academic needs (a discussion of specific texts follows in chapter 5). The transition to reading academic journal articles gives students models for their own work and forces them to make the transition from thinking critically in English to thinking critically about English.

Discussions and Assignments

Discussions and assignments for this class will need to maintain a strong relationship with the ultimate goal of the course in order to maintain a strong focus on our target need, as Jordan (1997) would define it. That is to say, discussions and other assignments should have some connection to an academic style of communication and that communication should either be in writing or about writing as much as possible. In addition to serving as writing and critical thinking practice for students, discussions and assignments for this class should also provide structured support in a manner that borrows from Cotterall and Cohen's scaffolding approach (2003). This can be done, as

Cotterall and Cohen describe, by focusing on each section of the paper for a predetermined portion of the semester. They also endorse modeling the composition process, and other strategies that could apply to this specific teaching situation include giving students a specific list of objectives that each section should satisfy (e.g. “Does the introduction clearly establish the context of this research effort within the greater sphere of work done in this area?”). Providing students with effective support in this manner, Cotterall and Cohen argue, frees them to focus on language as much as possible.

Another concern that must be kept in mind is the need to alleviate students’ language anxiety. Kondo and Ying-Ling’s (2004) study found that over a quarter of their subjects dealt with language anxiety with “resignation,” which is to say that they didn’t really deal with it at all. What’s more, language anxiety has the potential to become even more inhibiting in a class that requires students to respond constructively to each other’s work. However, some level of collaborative learning will be necessary, in part because scientific research is often conducted and published by multiple researchers and, as Hirvela (1999) notes, dialogue and interaction provide students with excellent opportunities to apply their growing knowledge of the English language.

Bikowski and Kessler’s (2002) idea about using discussion boards offers several benefits that apply directly to a class for nonnative technical students while helping to address the issues of language anxiety and collaborative learning. Most importantly, posting on discussion boards forces students to communicate in writing, and increased writing practice is always useful for a writing class. Further, by prompting academic discussion on the reading – “What point do you think the author was trying to make...?” rather than “What was your favorite...?” – students are forced to explore using language

in a way that fits the context, an approach that Krashen advocates. What's more, discussion boards offer a medium for interaction that puts technical students in a setting that they are comfortable with, in front of their computer. This allows nervous students to reread and revise their responses until they are comfortable with what they have written, which could go a long way toward helping those students whose language anxiety makes them reluctant to participate in live discussions.

With the bulk of students' responses to assigned reading happening online, in-class lectures would then provide the scaffolding that students need by focusing primarily on the specifics of writing an academic research paper (e.g., What should be included in an abstract?), some direct grammar instruction (more on this to follow), and on how to respond constructively to other students' drafts. In-class activities would mostly be encompassed by grammar exercises and peer-review workshops. Technical students are unlikely to have a great deal of experience with responding to other students' writing, so, just like the other elements of the class, the workshops would require the same kind of close guidance and structured support advocated by Cotterall and Cohen. One way of doing this would be to provide students with specific questions to answer about each section of the papers they review.

Put it Plainly

Clearly explaining the complexity of scientific research can be a challenge for native speakers, and it can be an overwhelming task for those writing in a second language.

With this in mind, it seems evident that students would benefit from some level of

instruction on how to make text easier for the reader to understand, though this creates the obvious challenge of determining which plain language strategies are likely to be helpful to nonnative technical students and which are not.

Thrush (2000), for example, conducted research that indicated that preferring Germanic vocabulary to Latinate vocabulary tends to be counterproductive when dealing with readers and writers who are native to Romance languages. Thrush also showed that a preference for phrasal verbs – such as *set up* in place of *establish* – tends to make texts less accessible for nonnative speakers, as the meaning of the idiomatic expression usually cannot be determined from simply knowing the meaning of the words that make up the phrase. We can easily infer that advising nonnative speakers to use phrasal verbs in their writing would be even more problematic.

With Thrush warning against plain language principles that focus on vocabulary choice and Grove (1988) finding that sentence-level principles (prefer the active voice while avoiding piling up subordinate clauses) are effective at helping at least some nonnative speakers, the best approach seems to be to focus on the sentence-level principles that consistently appear in the plain language literature of the last several decades, namely, use the active voice, trim unnecessary words, prefer verbs that express action, and avoid abstract nouns. I am intentionally leaving out a preference for short sentences, as such advice can limit students' stylistic maturity and even runs the risk of alienating them. However, the strategies that will be focused on should naturally lead to direct and concise writing.

A Place for Grammar

Direct grammar instruction is one of the most controversial topics in the field of teaching composition, as there is a great deal of disagreement on how much, if any, grammar instruction is best and what methods of grammar instruction are most effective.

Fortunately, Master (2000) and Burkhalter (1997) provide direction that applies to the given situation. As discussed in chapter 3, Master notes that nonnative students expect and want more grammar instruction, and Burkhalter finds that traditional grammar instruction can play an effective role in helping nonnative students.

This, of course, stands in contrast to Krashen's view that direct grammar instruction is of virtually no value in terms of acquiring language. This is a debate that has raged for decades and would be impossible to resolve here. While it may be presumptuous to assert that Krashen would be an advocate of all the details associated with the proposed class, he would likely approve of the emphasis on content-based instruction because of its focus on language practice. Further, it would be a mistake to think that Krashen would be totally disapproving of direct grammar instruction in a class with the specific purpose of producing an academic journal article of publishable quality, as a great deal of editing will be required to achieve the necessary quality, and Krashen acknowledges the usefulness of direct grammar instruction for improving students' editing skills. That is to say, Krashen would be less likely to be opposed to grammar instruction as long its purpose is to help students monitor their language use, which is how I propose to use it here, rather than to help them acquire language, for which CBI is much more effective.

Traditional grammar instruction, however, encompasses a very broad range of knowledge and skills, and this again raises the question of how to balance the need for holistic language improvement with the goal of helping students write a high-quality academic paper. The likeliest solution here is to focus on traditional grammar instruction that applies directly to the plain language principles identified in the previous section. That is to say, grammar instruction should focus on these areas:

- Identifying subjects and verbs.
- Identifying nominalizations and other signs of abstract nouns.
- Converting sentences with abstract nouns and weak verbs to sentences with concrete nouns and action verbs.
- Identifying active and passive voice and converting between the two.

Selecting a Drafting Process

As discussed in chapter 2, different resources advocate different drafting processes for writing a scientific paper. There is no “right” approach to drafting a scientific paper, and students should be encouraged to explore ways that work best for them, but if this class is to guide students through the drafting of an academic research paper and thus provide the scaffolding discussed earlier in this chapter, a drafting order needs to be established so that the instruction matches up with what students are working on and so that students can exchange similar sections of their papers for peer reviews.

I propose to follow a process that is a hybrid of the processes described in chapter 2 so as to take advantage of the strengths of each as they apply to nonnative speakers.

Students will begin with an outline with two or three sentences describing what will be included in each major section of the paper. Then students will write an abstract, with the warning that they may need to significantly revise it once the paper is complete. By beginning with a summary of the paper, the student and the instructor will be able to decide together whether the student is ready to begin writing or whether the student needs to spend some more time determining the focus and direction of the paper. As O'Connor and Woodford (1976) suggest, this can go a long way toward clearly establishing in the author's mind what the paper is meant to convey.

Once the abstract is complete, the rest of the process will follow Valiela's (2001) model: Start with the results section, then methods, then follow with the introduction and the conclusion. As Valiela explains, the data from the results section draws a roadmap for what to include in the methods section and what context to include in the introduction and conclusion. Beyond that, however, beginning with the data that is presumably the product of long hours of research allows students to stay in a comfort zone as they begin drafting before shifting away from discussing the particulars of what they have been working on for months or even years. This sort of guided structure that keeps students in a comfort zone as much as possible stays in line with Cotterall and Cohen's (2003) desire to free students to focus on language and structure as much as possible.

CHAPTER 5: IMAGINING THE COURSE

This chapter will take the conclusions from chapter 4 and translate them into specific teaching resources and methods. There are any number of texts, discussions, assignments, and workshops that would fit into the findings of chapter 4, and this chapter will seek to identify one set of specifics that satisfy those conclusions.

These are the course elements that this chapter will discuss in specifics:

- Texts
- Reading response assignments
- Grammar exercises
- Handouts for guiding peer responses
- A course schedule

Texts

Chapter 4 determined that an approach of “semi-sustained” content-based instruction – where readings are divided into one long text for the first half of the semester and a few

shorter academic journal articles for the second half – would best support student needs and goals for this course.

For the long text, John Seely Brown and Paul Duguid’s *The Social Life of Information* (2000) fits the requirements very well. It explores a topic that most technical students should find interesting and be able to relate to – a close examination of how information technology is influenced by the social networks that the technology and technology professionals are part of. The book discusses a complex subject matter in what Flesch would likely call a “plain style” that even readers from non-technical backgrounds can understand, and at less than 300 pages, *Social Life* is long enough to challenge students but not so long that they will not have time to work on their own writing.

Reading assignments in the second half of the semester would have to be lighter, as students would need more time to engage in their own drafting and revising. With this in mind, I have selected three academic journal articles for reading in the second half of the semester: Mazur’s “Revisiting Plain Language” (2000), Thrush’s “A Study of Plain English Vocabulary and International Audiences” (2001), and Larry Beason’s “Ethos and Error: How Business People React to Error” (2001). All three articles differ from *Social Life* in that they deal directly with issues related to language, thus representing a shift away from content-based instruction in which students think critically in English to more direct instruction in which students are compelled to think critically *about* English. Further, two of the articles, Thrush’s and Beason’s, communicate the findings of empirical research and serve as useful models for students.

Reading Response Assignments

As chapter 4 discussed, the bulk of reading response discussions for this class should take place online so as to alleviate students' language anxiety, put them in a setting that they will be extremely familiar with as technical students, and force them to engage in extra writing practice. The response prompts should compel students to think critically, and students would be required to respond to at least two of their classmate's responses. This promotes interactivity and encourages students to take the discussion in directions of their own choosing, which in turn requires them to explore new uses of language to fit each context.

Below are several sample discussion prompts about the texts mentioned in the previous section designed to force students to think critically and write about those thoughts in English.

Response Prompts for Brown and Duguid's *The Social Life of Information*

1. On page 31, Brown and Duguid make a statement that is critical to the central theme of the book: "The tight focus on information, with the implicit assumption that if we look after information everything else will fall into place, is ultimately a sort of social and moral blindness." What implications does this statement have on scientific research and our efforts to communicate research findings to others? What does it say about our responsibility as researchers that go beyond collecting and reporting data?

2. On pages 39 and 40, the authors talk about the dangers of redefining human beings as being similar to goal-pursuing “bots.” They go on to say, “It becomes important to pay attention to ways that human learning, developing taste, wanting, choosing, pursuing, brokering, and negotiating are distinct.” What implications does this statement have for how we approach attempts to communicate different sets of data in different contexts? How might those implications influence, for example, how you would present data to your thesis director as opposed to how you would present it in a grant proposal?

3. On pages 106 and 107, Brown and Duguid give an example of how story telling can be an effective way for colleagues to learn from each other how to apply similar principles in different situations. The authors conclude, “It is not shared stories or shared information so much as shared interpretation that binds people together.” How are shared interpretations useful to us as researchers, and how can we use those shared interpretations to our advantage when communicating our research?

4. In Chapter 4 the authors conclude that attempts to improve processes within an organization will fail if the social factors that allow the existing processes to function are not taken into account. What implications does this have for us as researchers as we seek to improve on existing products or practices? What social factors might influence the usefulness of your research or other recent major developments in your field?

5. How do the authors differentiate between information and knowledge? Do you feel that the purpose of your research paper is to transfer information or knowledge? Explain your answer in terms of how your audience can benefit from what your paper has to offer.

6. On page 166, Brown and Duguid note, “The same networks that allow knowledge to flow out, allow other knowledge to flow in...These formal ties are often preceded by informal relationships that develop across networks.” Describe a situation you have witnessed or experienced in your work or research in which an informal relationship has led to a significant transfer of knowledge. What can that kind of knowledge transfer teach us about the usefulness of collaboration in drafting and revising papers?

7. On page 189 the authors discuss the role that documents play in structuring society. What role do the documents published in academic research journals play in the structuring of their industries? How can your connection to such documents – be it as a reader, writer, subscriber, or dissenter – affect your role and your identity in your industry?

8. Brown and Duguid sum up their main point rather nicely on page 213:
“[E]nvisioned change will not happen or will not be fruitful until people look beyond the simplicities of information and individuals to the complexities of

learning, knowledge, judgment, communities, organizations, and institutions.” As researchers in engineering and the physical sciences, you are all endeavoring to create new technologies that will bring about some sort of change. Describe the change that you envision as a result of your research and discuss how it can affect or be affected by some of the complex factors listed by the authors (learning, knowledge, etc.).

Response Prompts for Beason’s “Ethos and Error: How Business People React to Error”

1. On page 60, Beason notes that “some teachers still make erroneous generalizations about students’ linguistic aptitude based on dialect-based ‘errors’ that in truth reflect valid grammatical systems.” Discuss how well this statement applies to your native language. Do teachers of your native language judge students harshly for dialect-based “errors,” and do you think they are justified for doing so? Compare your answer to what Beason says in the quote above about teaching English writing. Why might dialect-based “errors” be more acceptable in some languages and cultures than in others?
2. Examine Beason’s study from the perspective of an empirical researcher. Can you identify any faults in Beason’s methods? How might you improve upon his methods? Briefly describe how you would conduct a research project intended to build upon Beason’s conclusions.

Response Prompts for Mazur’s “Revisiting Plain Language”

1. On page 209, Mazur says that plain language guidelines “are useful tools for those who write as a secondary activity rather than as their primary profession.” What does this imply about the natural limitations of the effectiveness of plain language guidelines? How do those implications influence your feelings about plain language as a practice and field of study?
2. People who study language and writing often criticize plain language strategies for “dumbing down” language and sacrificing style maturity. How well does Mazur answer these criticisms on page 207? Look closely at the quotes from Cutts, Asprey, and the Securities and Exchange Commission. Do they give you a clear understanding of how a writer can write clearly without “dumbing it down”? Discuss what those quotes teach you – or fail to teach you – about writing clearly.

Response Prompts for Thrush’s “A Study of Plain English Vocabulary and International Audiences”

1. In the final paragraph of Thrush’s paper, she says that her study’s intent is to “highlight some specific areas [of Plain English] that might need further investigation.” Based on what you’ve read in the papers by Mazur and Thrush and what we’ve discussed in class, which plain language strategies do you feel are most effective at helping you, a nonnative speaker with your academic background from your specific country and culture of origin, understand written

English? Which are least effective? Do you feel that your answer would be different if your native language or academic background were different?

2. Thrush writes in the first-person, using “I” language, throughout her article. This is a practice that for many years was considered extremely poor form in academic and scientific writing because people believed that it “personalized” the text, which should focus only the data and the analysis of it. While much of the scientific community still frowns on the use of “I” language, it has become more accepted over the past few years. Discuss how Thrush’s use of “I” language has influenced the effectiveness of her paper, either positively or negatively. Find some sentences from the article that use the first-person, and rewrite them without the “I.” Do you feel that your revised sentences are better or worse than the originals? Why?

Grammar Exercises

Chapter 4 concluded that the most effective grammar instruction for the purposes of this class is instruction that focuses on sentence construction rather than on vocabulary choice. Below are some sample exercises that would help students learn to apply sentence-level principles to the editing phase of the writing process, both when reviewing their own work and when responding to classmates’ drafts.

Identifying Subjects and Verbs

Directions: Identify the simple subject and the main verb in each of the following sentences.

1. Brazil has won more World Cups than any other country.
2. Some people are surprised to learn that Uruguay has won the world championship of soccer twice.
3. The Uruguayans won the first ever World Cup as tournament hosts in 1930.
4. They defeated Brazil in the final in Rio de Janeiro 20 years later in one of the biggest upsets in the history of the tournament.
5. Brazil's first World Cup championship came in 1958 when the tournament was held in Sweden.
6. Just 17 years old, Pele established himself as one of the top players in the world during that tournament.
7. The 1958 World Cup in Sweden was the only time a South American team has won a World Cup that was held in Europe.
8. No European country has ever won a World Cup held outside of Europe.
9. The original World Cup trophy, the Jules Remet Trophy, was permanently awarded to Brazil after they won their fourth championship in 1994.
10. Thieves stole the trophy a few years later, and now its whereabouts are unknown.

Identifying Nominalizations and Replacing them with Concrete Nouns

Directions: Rewrite each of the following sentences for improved clarity. Whenever possible, the agent performing the action should be the grammatical subject. Hint: Look for vague nouns that can be converted to adjectives or verbs.

1. The intention of the Orlando Magic is to reach the playoffs.
2. There is a need for the City of Orlando to build another arena.
3. The Magic's loss in revenue is a result of their poor performances over the last few seasons.
4. The Magic's hope was that Steve Francis and Dwight Howard would develop into stars.
5. The team's inability to play strong defense has caused the team to lose too many games in the past.
6. Any shortcomings on defense will need correction.
7. An understanding as to the need to limit turnovers has been recognized.
8. Their utilization of the fast break was inefficient.

Converting Between the Active Voice and the Passive Voice

Directions: Identify whether each of these sentences are in the active or passive voice. If passive, make it active.

1. The professor was horrified by his students' inability to punctuate properly.
2. After the game was delayed because of the hurricane, the Pittsburgh Steelers defeated the Miami Dolphins on Sunday night.

3. Steelers coach Bill Cowher has been defeated in the AFC championship three out of four times.
4. His team lost to the Dallas Cowboys the Super Bowl in 1996.
5. Due to the University closure related to Hurricane Francis, the assessment of late payment fees is postponed until Friday, September 17.
6. All long distance calls will need to be logged and a copy of the log attached to billing.
7. On May 17, 1954, a case was decided by the United States Supreme Court that would change the course of American education.
8. The problem of production delays was solved.
9. A software virus was discovered by the systems analyst.
10. As usual, the paper feeder was jammed by the new letterhead.

Peer Review Handouts

As discussed in chapter 4, technical graduate students are unlikely to have a great deal of experience responding to their classmates' writing, and so they will need close guidance for their peer reviews. The instructor will divide the class into small groups of three or four students, and Figures 5.1 and 5.2 show examples of handouts that can be distributed to students with questions intended to shepherd them through a constructive peer review process.

Peer Review: Abstract and Title

Author _____ Reviewer _____

1. Consider the title. Does it give the reader a clear idea of what the article is about? If so, can you suggest a way of shortening it without removing key information? If the title does not adequately describe the topic, suggest improvements.
2. Does the abstract clearly indicate all the major subjects dealt with in the article? From reading the abstract, do you get the impression that the author has a clear idea of what the article is to convey? If so, write below a one-sentence summary of the abstract, and discuss with the author if it matches the primary point that the author is trying to convey.
3. Is the abstract of appropriate length and does it make the best use of the allotted space? If it is too long, identify information that can be left out or suggest ways of presenting the information more briefly.
4. Does it summarize the results and conclusions of the research? If so, write down the conclusions and results below and discuss with the author if they match the author's intent.
5. Consider the list of keywords. Do they seem to give a clear indication of the concepts and vocabulary that a reader will need to be familiar with to understand the article? Do you see any words that could be left off the list? Can you think of any that should be added?

Figure 1: Sample Peer Review for Abstract and Title

Peer Review: First Draft Complete Draft

Author _____ Reviewer _____

1. Does the introduction lend a historical context to the current research by connecting it to previous studies? Identify where in the introduction the author states the problem that the research seeks to address and where the author clearly states the most significant results of the investigation.

2. Consider the methods section. Does the author draw a clear picture of how the research was conducted? Identify where each of these elements is described: (1) the design of the study, (2) the means of data collection, and (3) an evaluation of the procedure.

3. Does the language used seem appropriate? Can you identify any words that might not fit an academic voice? Can you identify any unnecessarily obscure words that could be replaced by more common ones?

4. Identify where each of the tables and figures are referred to in the text. Do the captions adequately describe the tables and figures? Can you suggest improvements?

5. Do the tables include any unnecessary information? Is the text in the figures big enough to read with the naked eye? Can you suggest adding any figures or tables that would help further the reader's understanding? Are there any tables or figures that don't seem to help the reader's understanding?

Figure 2: Sample Peer Review for First Complete Draft

Course Schedule

As discussed in chapter 4, a great deal of the discussions for the proposed class will take place online, and so the course will meet in person only once a week for 75 minutes, with the rest of the class taking place online. Tables 5.1 and 5.2 show a hypothetical schedule for a 16-week semester, with Tuesday chosen arbitrarily for the weekly in-class sessions.

The Tuesday in-class meetings are designed to maintain a consistent focus on producing the academic paper which represents the primary goal of the course. Students will draft a major section of the paper and conduct peer reviews of those drafts every couple of weeks, and the drafting order will follow the process outlined in chapter 4, beginning with the abstract, then followed by Results, Methods, Introduction, and Conclusion, respectively. Students will, for example, draft an abstract in week three and distribute those drafts to the other members of their peer review groups (discussed earlier in this chapter). They will then discuss each others' drafts in week 4, and the process begins again with drafts of their Results sections in week 5. After conducting peer reviews of the Conclusions in week 12, students will bring in complete drafts in week 13 and workshop them in week 14. On the final two Tuesdays of the semester students will present their papers as they would at a conference.

Tuesday class time that is not devoted to peer reviews or other discussion of the major paper will focus on grammar and syntax activities that are intended to promote the plain language principles discussed in chapter 4. Week 1, for example, will include a review of subjects and verbs and an activity in which students identify subjects and verbs.

Week 3 will include similar work on nominalizations, week 5 action verbs, and week 7 active and passive voice.

The online portion of the class will focus on holistic language improvement using the semi-sustained content-based instruction approach discussed in chapter 4. Students will spend the first 8 weeks reading and responding to *The Social Life of Information*, with the reading occurring at a pace of a chapter each week. In weeks 2, 4, 6, and 8 students will post responses to the instructor's prompts (examples of such prompts are presented earlier in this chapter), and they will post responses to each others' posts in the odd-numbered weeks. Students will then read an academic journal article in each of weeks 9, 10, and 11. The readings will be shorter than those of the first eight weeks, and so during each of these weeks students will be expected to respond to the instructor's prompts and to students' prompts from the previous week. Week 12 will follow with just responses to classmates' posts from week 11, and the next three Thursdays will be reserved for one-on-one meetings with students to discuss their papers individually. Final drafts will be due on the last Thursday of the semester.

The split focus between drafting the paper and responding to reading creates the challenge of drawing connections between the in-class meetings on Tuesdays and the online work on Thursdays. The instructor will need to be diligent in discussing those connections on Tuesdays, possibly sparking a short discussion at the start of each class. In Tuesday of week 3, for example, the instructor might talk about students' responses from the previous Thursday to *Social Life* prompt #1 (from earlier in this chapter). The instructor could connect that discussion to the idea that the purpose of a research paper is not just to report data, but to set that data in a context that is relevant to the reader.

Students can then be directed to make sure that the abstracts they are about to review in groups reflect a discussion of the greater relevance of the research.

Table 3: Course Schedule Weeks 1-8

	M	Tuesday (in class)	W	Thursday (online)	F
Week 1		Distribute syllabus; Discuss the importance of publication; Review subjects and verbs; Activity: ID subjects and verbs exercise		Reading: TSLOI pp. 1- 34; HW: Post directions for making a model airplane	
Week 2		Discuss Abstracts; Activity: Try to make model airplanes following a classmate's directions		Reading: TSLOI pp. 35- 62; HW: Post Reading Response	
Week 3		HW: Bring in abstracts with copies for peer review. Discuss concrete nouns. Activity: Nominalizations exercise.		HW: Respond to at least two classmates' posts from last week; Reading: TSLOI pp. 63-90	
Week 4		HW: Bring in completed peer review sheets and group members' copyedited abstracts. Activity: Workshop abstracts. Discuss Results section.		Reading: TSLOI pp. 91-116; HW: Post Reading Response	
Week 5		HW: Bring in Results section with copies for peer review. Discuss action verbs. Activity: Replacing to be verbs with action verbs.		HW: Respond to at least two classmates' posts from last week; Reading: TSLOI pp. 117-146	
Week 6		HW: Bring in completed peer review sheets and group members' copyedited Results sections. Activity: Workshop Results sections. Discuss Methods section.		Reading: TSLOI pp. 147-172; HW: Post Reading Response	
Week 7		HW: Bring in Methods section with copies for peer review. Discuss active and passive voice. Activity: Convert between active and passive exercise.		HW: Respond to at least two classmates' posts from last week; Reading: TSLOI pp. 173-206	
Week 8		HW: Bring in completed peer review sheets and group members' copyedited Methods sections. Activity: Workshop Methods section. Discuss Introductions.		Reading: TSLOI pp. 207-252; HW: Post Reading Response	

Table 4: Course Schedule weeks 9-16

Week 9		HW: Bring in Introduction with copies for peer review. Discuss TSLOI.		HW: Respond to at least two classmates' posts from last week; Reading: Beason article; HW: Post Reading Response	
Week 10		HW: Bring in completed peer review sheets and group members' copyedited Introductions. Activity: Workshop Introductions. Discuss Conclusions.		HW: Respond to at least two classmates' posts from last week; Reading: Mazur article; HW: Post Reading Response	
Week 11		HW: Bring in Conclusions with copies for peer review. Discuss Beason article.		HW: Respond to at least two classmates' posts from last week; Reading: Thrush article; HW: Post Reading Response	
Week 12		HW: Bring in completed peer review sheets and group members' copyedited Conclusions. Activity: Workshop Conclusions.		HW: Respond to at least two classmates' posts from last week	
Week 13		HW: Bring in complete drafts with copies for peer review. Discuss Mazur and Thrush articles.		20-minute individual conferences with instructor to discuss final drafts (part 1).	
Week 14		HW: Bring in completed peer review sheets and group members' copyedited drafts. Activity: Workshop drafts.		20-minute individual conferences with instructor to discuss final drafts (part 2).	
Week 15		Present papers (part 1)		20-minute individual conferences with instructor to discuss final drafts (part 3).	
Week 16		Present papers (part 2)		Submit paper copies of final drafts by noon to my mailbox.	

CHAPTER 6: LIMITATIONS, APPLICATIONS, AND FUTURE WORK

Limitations

This thesis carries with it the same risks and limitations that would apply to any endeavor that draws from multiple existing theories in order to create new practices and approaches to solving a given problem without collecting a great deal of new empirical data. Among the obvious risks is the possibility of applying an existing theory or practice in a way that its originators and leading practitioners never imagined or intended. Krashen and Kasper, for example, may feel that the pedagogical approach outlined in this thesis strays too far from the most basic element of content-based instruction – freeing students to study and discuss at a critical level material that is not fundamentally connected to language.

Heyden, similarly, may feel that the split focus between responding to reading and drafting an academic research paper sacrifices one of the key benefits of sustained CBI, maintaining a clear and consistent context for reading, discussion, and critical thinking.

Cotterall and Cohen, meanwhile, might feel that their scaffolding approach to an intensive English for academic purposes program would have students shifting focus too

often and too quickly to be effective in a course that meets in a classroom for about one-tenth the amount of time as their intensive program did.

I would, of course, have my answers to these criticisms. To Krashen and Kasper, I would answer that while pure CBI that is free of any kind of direct language instruction may indeed be the best way of effecting language acquisition, CBI alone does not do enough to address the primary purpose of the proposed class, which is to produce an academic research paper of publishable quality. Any attempt to produce a very specific kind of document requires direct instruction on how to produce that document, and the approach outlined in this thesis attempts to address that from both a stylistic perspective, with sentence-level instruction on select plain language techniques, and a content and organizational perspective, with a guided drafting process.

To Heyden, I would argue that, while my “semi-sustained” CBI does sacrifice a certain degree of consistency for the sake of maintaining a focus on the objectives of the course, graduate students who have already passed the TOEFL exam and who have a history of academic success do not require the same “kid gloves” treatment as students who are only beginning to acquire a new language and who do not have the experience of successfully completing an undergraduate program of study. And to Cotterall and Cohen, I would point out that while the proposed class would not benefit from the 20 or more hours of direct contact with students that their IEP course does, graduate classes habitually demand that many hours of work from students outside of the classroom, and graduate students would be accustomed to long hours of working independently toward their own learning.

This dialogue being one-sided, it is clearly limited by my ability to anticipate the criticism of the authors cited throughout this thesis and other authorities in the fields of scientific research, technical communication, and second-language acquisition. Consideration and response to those criticisms will be necessary to the continued evolution of the pedagogical principles developed in this thesis.

The Next Step

With the salient questions and concerns answered to the extent possible based on existing data, the next logical step is to test the conclusions of this thesis in an actual classroom. Determining how best to conduct such a test, however, is not as simple as teaching the class outlined in chapter 5 and analyzing the results.

One significant complication arises from the lack of an obvious control group. One approach would be to teach the proposed class to “target” students according to the criteria established in chapter 1 and compare their success in publishing their research to the success rates of “target” students who did not take the course. However, a significantly greater success rate for students who took the class would do little to confirm the validity of the pedagogical ideas that are at the heart of this research. Such a study would, in fact, only be indicative of the general need for a class that pushes students to communicate their research, rather than confirm the specific teaching methods used, as no other methods were tested. Of course, empirical data supporting the need for a course intended to help nonnative technical graduate students publish their research would be extremely useful in confirming the need to find best practices associated with

teaching such a course, making it an important step in the research path, but it would do little in terms of actually identifying those best practices.

Studies seeking to determine the validity of each of the specific conclusions discussed in chapter 4 would require comparing the results of different classes in which each class altered a specific element of the course. One class might, for example, reduce or eliminate grammar instruction in favor of more reading and writing in an effort to verify my conclusions about the limits of CBI as it relates to the objectives of the course. Another might change the nature of the texts used to something less academic to see if increasing students' comfort levels is of greater value than giving students models for their own writing. Yet another possibility might involve altering the drafting process, or scaling back on the reading assignments to allow for more writing time, or restructuring the schedule so that the vast majority of the reading happens in the first half of the semester and the vast majority of the paper drafting happens in the second half.

There are several possible variations that could shed light on the many possible approaches to teaching the proposed class, but the challenges associated with conducting the necessary empirical research are not limited to selecting the most useful variations. The other major challenge concerns how best to assess the success of the course.

Tracking students' publications in the 12 to 24 months following the class might allow researchers to make some general inferences, but it would be difficult to reach any definitive conclusions based on this because of the small sample sizes (classes sizes are unlikely to be much larger than 15 students) and the fact that publication success will always be limited by the quality of the research itself.

The available literature does not offer much in the way of assessment methods for scientific research papers. The TESOL literature features extensive discussions on assessment, but these methods deal with evaluating holistic language improvement, which, while a necessary element of the proposed class, is not the primary focus of it. Any assessment that deals only with language competency would fail to answer the question of whether or not the class meets its objective.

Herbert Michaelson (1990) does provide some direction for assessment by identifying five elements of quality in a research paper: technical content, validity, organization, literary style, and significance (this last element refers to how well the paper illustrates the greater relevance of the research). The first two elements, technical content and validity, are products of the quality of the research, not the quality of the communicative effort, but organization, style, and significance are all factors that the proposed class seeks to address. A teacher-researcher might invite a panel of technical communication professors and professionals (they would, of course, need to have no other stake in the research effort) to assign scores to each paper's organization, style, and significance based on a predetermined rubric.

Our ability to conduct these studies will be limited by the necessity to balance our needs as researchers against the learning needs of the students. That is to say, a teacher would need to have a reasonably compelling reason to believe that altering a given element of the course would improve – or at the very least not harm – students' ability to learn how to write an academic research paper. This limitation that is associated with all teacher research efforts makes it critically important to take advantage of already existing

research in related fields and give as much direction as possible for the empirical research, as this thesis attempts to do.

Applications

Even though the proposed course will likely continue to take shape as we continue to gather more qualitative and quantitative data, the number and types of institutions and organizations that would benefit from the principles and strategies outlined in this thesis are limitless, in no small part because those principles and strategies could be modified slightly to fit different needs.

The institutions most likely to find a use for this class are obviously universities in the United States that attract large numbers of foreign students to their programs in engineering and the physical sciences, but other possibilities abound. With English having been established as the international language of science (as discussed in chapter 1), foreign universities could find a need for a course similar to the one proposed here. It may need to be adapted for students who do not have the language skills necessary to pass the TOEFL (possibly by expanding the course across two semesters), but many of the core principles discussed in this thesis would still apply. Outside of the academic realm, multinational organizations might find a variation of this course useful for improving communication between offices that are separated not just by distance, but by language and culture as well. Similarly, companies with roots in non-English-speaking countries might find an adaptation of this course useful for preparing their executives and

sales staff for attempts to establish relationships and infiltrate markets in English-speaking countries.

The possible applications of this research are expansive, and more unforeseen uses will likely arise as work on this topic continues and we learn more about ways to address the advanced writing needs of nonnative speakers of English. What is clear today, however, is that improved communications skills can go a long way toward improving scientific research as a whole, and figuring out ways to effectively teach those skills to the researchers who need them the most is both necessary and within our capabilities.

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